News In Health

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How To Stop an Outbreak

Computers Help Plan for a Deadly New Flu

As you stand in line waiting to roll up your sleeve for that annual flu shot, you may wonder why you need the **influenza vaccine** every year when other types of vaccines offer a lifetime of protection. The reason is that the virus that causes the flu constantly changes over time, so the vaccine you got last year may not protect you against the bug this year. Each year, researchers try to predict how the flu virus will change and develop a new vaccine before flu season starts.

But what if a different, deadlier type of flu started to quickly spread? One bug now has some researchers worried, and they are using computer technology to figure out how best to fight a potential outbreak.

In 1997, a type of flu found in poultry infected 18 people in Hong Kong and 6 of them died. As this bird flu spread to other fowl and moved into other areas of Southeast Asia, more human cases appeared. To date, 112 people have caught bird flu and more than half of them have died. This number may seem small compared to the thousands who die annually from flu-related complications, but for some health officials the bird flu deaths may be an early warning for a deadly worldwide outbreak.

Fortunately, the bird flu doesn't currently spread easily from person to person, but a change in the virus could soon make this possible. If this happens, an outbreak could quickly spread across the globe to become a **pandemic**. Because most people haven't been exposed to bird flu and have no natural protection against it, millions could get sick and even die. The two most recent pandemics caused by a combination of bird and human flu viruses, in 1957 and 1968, killed more than 100,000 Americans. The 1918 flu pandemic caused more than half a million deaths in the U.S. and up to 50 million worldwide.

Researchers can't predict when or even if the bird flu in Southeast Asia could turn into a pandemic. But to be better prepared in case an outbreak begins, scientists are working to understand the virus, its impact and what can be done to prevent its spread.

"The pressing questions are if and how we can contain an outbreak of [bird] flu at the source before it becomes a pandemic," said Dr. Ira

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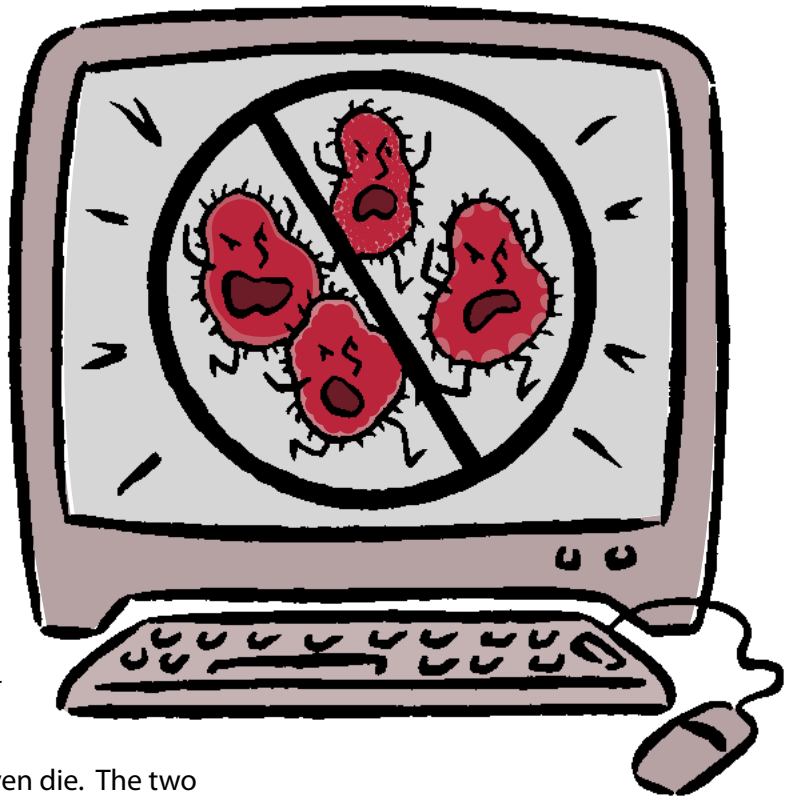

Definitions

Influenza
The flu, an illness caused by viruses that attack the respiratory system. Symptoms include fever, chills, body aches, runny nose, sore throat, headache and extreme exhaustion.

Pandemic
A disease outbreak that spreads to people in different parts of the world.

Vaccine
A product that is injected, swallowed or inhaled to activate the body's defenses and prevent future infection.

Inside News

Key Facts about Avian Influenza (Bird Flu):
www.cdc.gov/flu/avian/gen-info/facts.htm

Focus on the Flu: www3.niaid.nih.gov/news/focuson/flu

What to Do About Flu: www.niapublications.org/engagepages/flu.asp

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Longini, Jr. of Emory University, a member of a research group supported by NIH's National Institute of General Medical Sciences (NIGMS) that's using computers to investigate what we can do to stop an outbreak at the source.

Longini and his colleagues created **computer models**, virtual laboratories where they could study different situations based on actual data. These models, built on census statistics collected by the Thai government and information about the infectiousness of previous flu viruses, let the researchers model mock bird flu outbreaks in Southeast Asian communities.

With each scenario the researchers developed, they watched what happened as the virus spread across the virtual map. Did vaccinating people, even if the vaccine didn't work very well against the new virus, slow the flu's spread? Did **antiviral drugs**, which can lessen flu symptoms and prevent new infections, help contain the infection? Was quarantining people effective?

The researchers found that a combination of measures, like giving antiviral medications plus quarantining everyone near an infected person, could stop the virus in its tracks if started early enough. Additional strategies, including vaccination, were needed when the virus was more contagious.

The scientists will adjust the computer models in response to new information about the bird flu and human cases. "As these modeling approaches develop, they will offer policymakers and researchers powerful tools to use in strategic planning," said NIGMS director Dr. Jeremy M. Berg.

These computer models are just one way that NIH-supported scientists are working toward understanding and preparing for a bird flu pandemic. Researchers funded by NIH's National Institute of Allergy and Infectious Diseases (NIAID) have tested and shown that one of the antiviral drugs currently used to treat the symptoms of seasonal flu also could work for bird flu. Other NIAID researchers are testing a bird flu vaccine and expect results by the end of the year.

Each year in the United States, more than 100,000 people are hospitalized and about 36,000 people die from the flu and its complications, the Centers for Disease Control and Prevention estimates. Understanding how flu spreads and how the tools we have affect its spread are crucial to fighting future outbreaks. ■

Definitions

Antiviral drug
Medication used to destroy or weaken a virus after infection.

Computer model
A computer program that predicts the results of a series of complex events.

Wise Choices
How to Avoid The Flu

- Get a yearly flu vaccine if your doctor recommends it. It's the best way to keep from catching the flu viruses that go around each year. Keep in mind, though, that the vaccines currently available to the public won't yet protect you from bird flu.
- Stay home when you're sick and avoid contact with others who are sick. These simple measures can help stop the spread of influenza and other contagious illnesses.
- If you travel to Southeast Asia, use caution when handling and cooking poultry that may be infected with bird flu.

Statistics
Bird Flu

- Poultry infected with bird flu have been found in Indonesia, Vietnam, Thailand, Cambodia, China, Japan, Korea, Russia and Kazakhstan.
- Most human cases of bird flu have been traced back to direct contact with diseased or dead poultry in rural areas of Southeast Asia.
- Among the 112 people who have caught bird flu, 57 have died.

Source: World Health Organization

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Cold, Flu or Allergy?

Figuring Out What's Ailing You

Each year, millions of school and work days are missed because of colds and flu, and we're heading into their prime season now. How you can best treat your condition depends on whether it's a cold or flu that's ailing you. Since these diseases share many of the same symptoms, they're sometimes hard to tell apart.

Complicating the problem, many people get bad allergies in the fall, when ragweed pollen is at its peak in many areas, and winter can bring its own allergies as people spend more time indoors around pet dander and house dust mites. When the sniffles, stuffy nose and coughing begin, this chart can help you decide how to handle your symptoms. ■

The Common Cold: www.niaid.nih.gov/factsheets/cold.htm

Flu: www.niaid.nih.gov/factsheets/flu.htm

Airborne Allergens: Something in the Air: www.niaid.nih.gov/publications/allergens/airborne_allergens.pdf

Symptoms	Airborne Allergy	Cold	Flu
Fever	Never	Rare	Usual, high (100-102°F), sometimes higher—especially in young children); lasts 3-4 days
Headache	Rare	Rare	Common
General Aches, Pains	Never	Slight	Usual; often severe
Fatigue, Weakness	Sometimes	Sometimes	Usual, can last up to 3 weeks
Extreme Exhaustion	Never	Never	Usual, at the beginning of the illness
Stuffy, Runny Nose	Common	Common	Sometimes
Sneezing	Usual	Usual	Sometimes
Sore Throat	Sometimes	Common	Sometimes
Cough	Sometimes	Common, hacking	Common, can become severe
Chest Discomfort	Rare	Mild to moderate	Common
Treatment	-Antihistamines -Nasal steroids (prescription only) -Decongestants	-Antihistamines -Decongestants -Aspirin, acetaminophen (such as Tylenol) or ibuprofen for aches and pains	-Aspirin, acetaminophen or ibuprofen for aches, pains and fever -Antiviral medicines (see your doctor)
Prevention	Avoid those things that you are allergic to, such as pollen, house dust mites, mold, pet dander, cockroaches	-Wash your hands often -Avoid close contact with anyone with a cold	-Wash your hands often -Avoid close contact with anyone with the flu -Annual vaccination -Antiviral medicines (see your doctor)
Complications	Sinus infection, asthma	Sinus congestion, middle ear infection, asthma	Bronchitis, pneumonia; can be life-threatening

Health Capsules

Bacteria in Dust Linked to Asthma

Asthma and wheezing may be triggered by a chemical from bacteria that lurk in household dust, according to a large nationwide study by researchers at NIH's National Institute of Environmental Health Sciences and the University of Iowa.

Scientists studied more than 2,500 dust samples from bedroom, kitchen and living room floors and from bedding and upholstered furniture in 831 homes across the United States. The researchers found that bacterial chemicals called **endotoxins**—in particular, on bedroom floors and in bedding—are linked to increased breathing problems in adults. Adults in households with higher levels of endotoxin had more diagnosed asthma, asthma symptoms, asthma medication use and wheezing, whether or not they had allergies. The likelihood of recent asthma symptoms was nearly 3 times greater for people exposed to high levels of endotoxin in the bedroom.

Previous studies have shown that house dust contains endotoxin. Pets, pests, humidifiers and kitchen compost bins can all increase the level of endotoxin in a home. Interestingly, early life exposure to household endotoxin protects children against the development of allergies. In contrast, this new research shows that adult exposure to endotoxin raises the risk of asthma. A growing understanding of how asthma is triggered will eventually help in the prevention and treatment of this disease. ■

What is Asthma?
www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_WhatIs.html

Asthma and Allergy Prevention:
www.niehs.nih.gov/airborne/prevent/intro.html

Why The Cough?

Coughs can be a real annoyance, but they serve an important purpose, helping to clear mucus and foreign material like dust from your airways. Most coughs are caused by the common cold, but a violent or persistent cough shouldn't be ignored.

Coughs lasting 3 weeks or less are most often caused by a cold, but they might be a sign of more serious illness. Pneumonia can cause coughing, high fever, shortness of breath, rapid breathing and chest pain. Congestive heart failure, a condition where the heart can't pump enough blood, can cause coughing, shortness of breath, difficulty breathing, fatigue and swelling.

"Chronic" coughs lasting 3 weeks or more are often caused by postnasal drip, mucus draining down the back of your throat, from allergies. But they can also be a sign of more serious underlying medical problems. Asthma can cause chronic coughing, chest tightness, wheezing and trouble breathing. Lung cancer causes a chronic cough, chest pain, shortness of breath and other symptoms. Tuberculosis causes a chronic, debilitating cough and chest pain.

Gastroesophageal reflux disease (GERD) can cause chronic coughing, too. When the opening between the esophagus, which carries food from the mouth to the stomach, and the stomach doesn't close properly, stomach contents can leak back, or reflux, into the esophagus. This can cause heartburn, trouble swallowing, bad breath and a dry cough.

A cough that won't go away and produces lots of mucus may be a sign of chronic obstructive pulmonary disease (COPD), in which the lung is damaged, making it hard to breathe. Most often caused by smoking, COPD is the 4th leading cause of death.

Cough drops and other treatments may help your coughing, but if you develop a violent cough or one that lasts for more than 3 weeks, see your health provider to make sure it's not a sign of a serious health problem. ■

For more information on the conditions mentioned in this story, search the NIH Health Information Page at health.nih.gov.

Definitions

Asthma
A chronic disease that causes your airways, the tubes that carry air in and out of your lungs, to get narrower so that less air flows through. Symptoms include wheezing (a whistling sound when you breathe), coughing, chest tightness and trouble breathing.

Endotoxin
A type of chemical produced by certain bacteria that is released when they die and disintegrate.

Featured Web Site
LifeWorks

science.education.nih.gov/LifeWorks

Interactive web site for middle and high school students to explore a wide range of health and medical science careers, from surgeon to science writer to forensic science technician and many others. *From NIH's Office of Science Education.*